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ABSTRACT

One of the most important, yet difficult concepts to teach in an undergraduate course in intermediate microeconomics is the all-embracing concept of elasticity of demand. This paper details a four part teaching approach developed to make this most important aspect of microeconomic theory more understandable. Part 1 develops the approach for teaching price elasticity of demand, including a schema to be displayed in class, and graphs and essential characteristics for the following cases: relatively elastic demand curve, relatively inelastic demand curve, unitary elastic demand, perfectly elastic demand curve, and perfectly inelastic demand curve. Part 2 develops the approach for teaching income elasticity of demand. Part 3 develops the approach taken to teach cross elasticity of demand. Part 4 reviews the formulas and their relationships and presents the conclusions of the paper. Because the merit of microeconomics is resurfacing as an approach to the solution of macroeconomic problems, these elasticity of demand concepts assume even greater importance for teaching elasticity in an intermediate microeconomics course. With the approach outlined in this paper, students will be well-equipped to use these analytical tools. (GEA)

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Teaching Price, Income and Cross Elasticity of Demand: Another Approach

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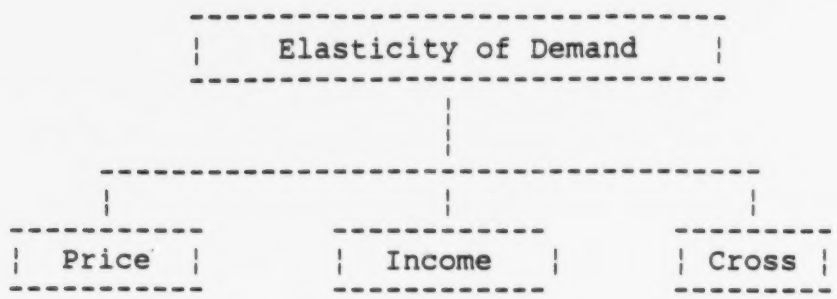
One of the most important yet difficult concepts to teach in an undergraduate course in intermediate microeconomics is the all embracing concept of elasticity of demand. After having derived the demand curve from indifference analysis, most authors of micro texts then move on to elasticity of demand with a mass of material crammed into one chapter. This usually makes it rather difficult for the student to grasp the relationship between price, income, and cross elasticity.

The purpose of this paper is to share with colleagues a teaching approach I have developed to make this most important aspect of microeconomic theory more understandable. This step-by-step approach helps to show the importance of and the interrelationship among these three types of elasticities.

This paper consists of four parts. Part I discusses the approach and methodology used to teach price elasticity of demand. Part II discusses the approach used to teach income elasticity of demand. Part III presents the approach taken to present the nebulous concept cross elasticity of demand. Part IV presents the conclusion of the paper.

First, place this schema on the blackboard as a background framework:

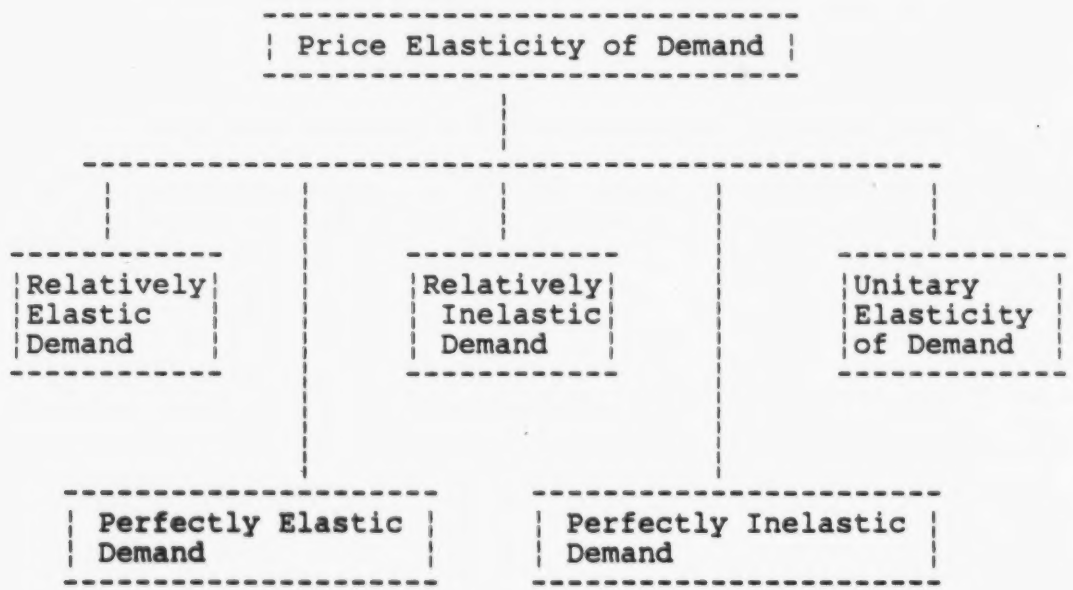


Part I

Price Elasticity of Demand

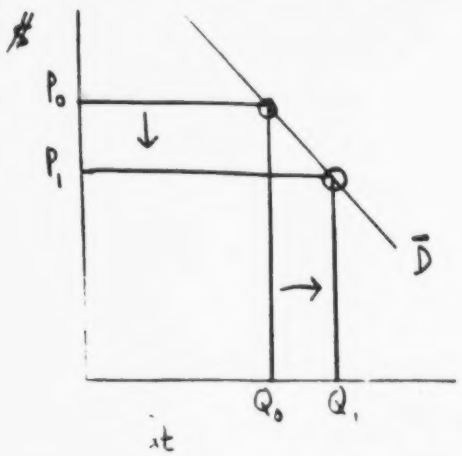
This section of the paper will develop the teaching approach of price elasticity of demand. The following chart is presented on the blackboard and helps the student to visualize what is about to unfold.

Table 1 - Price Elasticity of Demand Schema



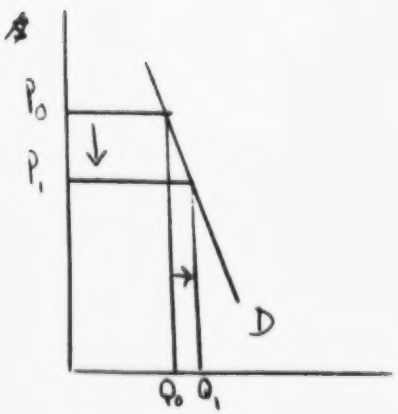
The following graphs and essential characteristics are presented for each of the five cases of price elasticity of demand.

I. RELATIVELY ELASTIC DEMAND CURVE



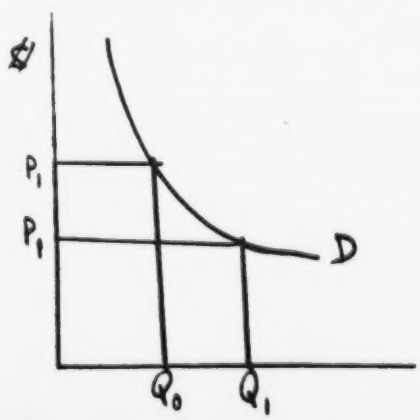
1) Δ in quantity demanded Formula: $\Delta Q = f(\Delta P, \bar{Y})$
2) If P falls, TR rises or if P↑ , TR↓ (Arrows are inversely related)
3) Type of product-luxury good
4) $e_p > 1$

II. RELATIVELY INELASTIC DEMAND CURVE



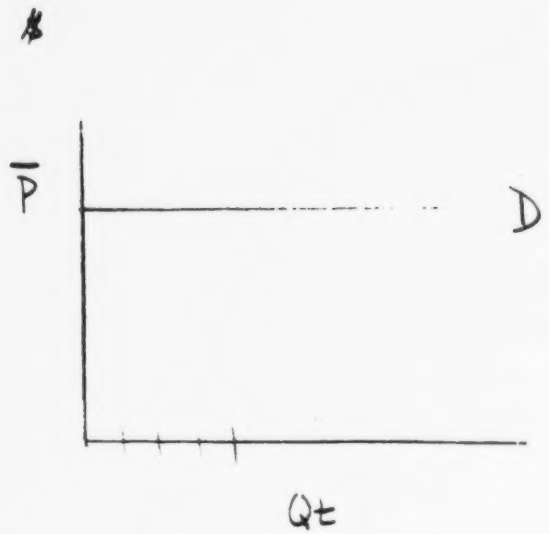
1) Δ in quantity demanded $\Delta Q = f(\Delta P, \bar{Y})$
2) If P falls - TR falls, P↑ , TR↑ (Arrows go in same direction)
3) Type of product - a necessity
4) $e_p < 1$

III. UNITARY ELASTIC DEMAND



1) Δ in quantity demanded $\Delta Q = f(\Delta P, \bar{Y})$
2) Whether P rises or falls, TR is a constant.
3) Type of product - None in particular
4) $e_p = 1$
5) Rectangular hyperbola

IV. PERFECTLY ELASTIC DEMAND CURVE



1) Price-taker firm
2) $e_p = \infty$ $(\frac{1}{0})$
3) Purely competitive market
4) P = MR = AR = D

Proof:

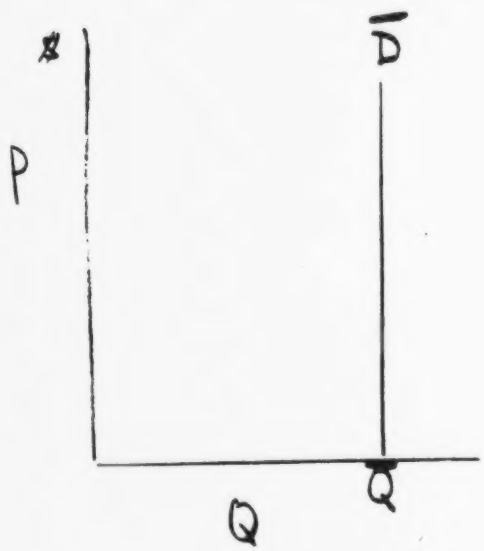
P	Q	TR	MR	AR*
$5	1	5	5	5
$5	2	10	5	5
$5	3	15	5	5

* $AR = \frac{TR}{Q}$

$AR = \frac{P \cdot Q}{Q}$

$\boxed{AR = P}$

V. PERFECTLY INELASTIC DEMAND CURVE



1) $e_p = 0$ $(\frac{0}{1})$
2) Product-drug necessary for one's survival (insulin)

In teaching price elasticity of demand, I use this approach:

1) Redefine the concept.

2) Review the point elasticity formula 2 ways:

$$ep = \frac{\frac{\Delta Q}{Q}}{\frac{\Delta P}{P}} \qquad \text{or} \qquad ep = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

3) Given the following equation, find the value of the price elasticity coefficient with respect to X.

$$Qx = 1{,}000 - .10Px^2 + .4Py + .05Y$$

Steps:

1) Find the first derivative with respect to X.

2) Find the value of Q_X (Given: P_X = \$10 P_Y = \$20 Income = \$10,000) from the given demand function.

3) Plug the data in the equation. Solve for coefficient to determine type of elasticity. The important pedagogical point to stress is the negative sign in the equation before the Price of X. This tells us that we are talking of price elasticity and an inverse relationship. The law of demand states that as price falls, the change in quantity demanded increases. Contrawise, as price increases, the change in quantity demanded decreases.

Part II - Income Elasticity of Demand

Income elasticity of demand is developed by first referring back to the derivation of Engel's curve and indifference curve analysis. The income elasticity of

demand formula is then presented and is compared to the price elasticity of demand formula. This helps to show the relationship between the two equations. The denominator in each equation of the first term becomes the subscript for the elasticity symbol.

$$ey = \frac{\Delta Q}{\Delta Y} \cdot \frac{Y}{Q} \qquad \text{vs.} \qquad ep = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

Graphs are drawn to show that normal goods (a value of greater than zero) with a positive relationship and inferior goods a negative relationship. The difference between income elastic, income inelasticity and unitary income elasticity of demand are explained. The value of a coefficient such as 1.5 is explained -- examples such as books, travel are shown to fall within this cateogory. Inferior goods are handled by using the marketing approach that a consumer wishes to trade-up as their income increases.

The equation, $Q_x = 1{,}000 - .10P_x^2 + .4Py + \underline{.05Y}$, that was used in Part I is now presented to compute the income elasticity of demand. It is first pointed out that a positive sign in the equation before the income variable tells us the product in question is a normal good. A positive sign is of a normal good -- as income increases, the quantity consumed will increase -- the degree of intensity depends whether it is a luxury or a necessity. A negative sign before the variable tells us that we would be dealing with an inferior good. As income rises, the demand

for that product will be replaced by an normal good -- an inverse relationship.

Part III - Cross Elasticity of Demand

This tends to be the more difficult concept to get across to the students. First, explain the difference between complementary and substitute goods. The assumption that they remember the difference is usually not true.

Present the formula for cross elasticity as follows, showing a relationship to the price elasticity of demand formula already discussed in Part I:

Cross Elasticity of Demand Formula	Price Elasticity of Demand Formula
$eyx = \frac{\Delta Qx}{\Delta Py} \cdot \frac{Py}{Qx}$	$ep = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$

Point out the difference in the subscripts in the cross elasticity formula. We are relating how a change in the price of Y will affect the change in the quantity demanded of product X.

Return to the basic equation:

$$Qx = 1{,}000 - .10P_x^2 + \underline{.4Py} + .05Y$$

Before solving for the cross elasticity of demand coefficients, first point out that the sign before product Y is positive which tells us that the product in question is indeed a substitute. A complementary good would have had a negative sign preceding the variable.

Procedure

1) Take the first derivative with respect to Py of good X.

2) Price of Y is given, the quantity of X had been arrived at from the price elasticity of demand.

3) Solve the problem for the coefficient.

4) Find the coefficient value.

Part IV

Summary and Conclusions

As a recap and summary, present the three formulas now as one unit and review their relationships:

$e_p = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$ Price elasticity of demand

$e_y = \frac{\Delta Q}{\Delta Y} \cdot \frac{Y}{Q}$ Income elasticity of demand

$e_{yx} = \frac{\Delta Qx}{\Delta Py} \cdot \frac{Py}{Qx}$ Cross elasticity of demand

After completion of this three-fold elasticity exercise, a similar type homework problem is then assigned for the next class meeting. Feedback as to the effectiveness of this approach can then be ascertained. Student reaction and results have been most favorable.

In summary, because the merit of microeconomics is now resurfacing as an approach to solve macro problems, these elasticity of demand concepts take on even greater importance in teaching "elasticity" in an intermediate microeconomics course. With the approach outlined above, students will be well equipped to use these analytical tools.